



Rapid Freeze ICE FLAKERS
INSTALLATION & SERVICE MANUAL
and parts catalog

General Purpose Flake Ice Machines
2000 to 6000 lb/day Capacity

- Remote Low side Series (RLE)
- Mobile Express Storage bins (CP)
- For Secondary and Cascade CO₂ Systems



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The information contained herein is applicable to the specified models current at the time of publication. Some information in this manual will be of use to owners of older model machines. The reader is cautioned that use of this manual with older equipment is at the user’s risk. Howe Corporation makes no warranty or guarantee, explicit or implicit with regard to the use of this manual with equipment models outside the scope of this manual. If in doubt of the scope of this manual, contact Howe Corporation.

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Introduction

Howe Rapid Freeze® flakers are available world-wide in over 2000 Howe locations

The Howe Rapid Freeze® Flaker is backed by over 50 years of proven performance and innovation. Long known for durability and reliability, our flake ice equipment is unsurpassed in energy efficiency and low maintenance.

Available in a wide variety of sizes and configurations, the rugged Rapid Freeze® Flaker can be found in diverse applications from supermarkets and food processors to remote fishing villages.

Rapid Freeze® Energy Efficiency

The Rapid Freeze® Flaker Ice Machine enjoys a world renowned reputation for having one of the highest energy efficiency rating (EER) of any ice maker on the market. With energy usage of 30 - 40% below that of many competitors' models, the Rapid Freeze® ice machine offers an outstanding value.

In addition to high energy efficiency, the Rapid Freeze® Flaker is extremely dependable with very low maintenance cost. Overall, the cost of owning and operating a Howe Rapid Freeze® Flaker is one of the lowest in the industry.

Important Safety Information

The Information found in this manual is intended for use by individuals possessing adequate backgrounds of electrical, refrigeration and mechanical experience. Any attempt to repair or make alterations to this equipment may result in personal injury or property damage. The manufacturer or seller cannot be responsible for the interpretation of this information, nor can it assume any liability in connection with its use.

Special Precautions To Be Observed When Charging Refrigeration Systems

Only technically-Qualified persons, trained and Certified in the handling of refrigerant and operation of refrigeration systems, should perform the operations described in this manual.

Introduction

Safety Symbols & What They Mean

Please read and understand this manual prior to installing or operating this Rapid Freeze® Ice Flaker. You must be completely familiar with the start-up, operation and service of this Flaker **BEFORE** you attempt to start, operate or adjust this piece of equipment.

These safety symbols will alert you to any special precautions throughout this manual.

***** DANGER *****

BEWARE OF HAZARDS WHICH CAN RESULT IN PERSONAL INJURY

***** DANGER *****

***** WARNING *****

"DO IT RIGHT" OR RISK SEVERE PERSONAL INJURY.

FOLLOW INSTRUCTIONS.

***** WARNING *****

***** CAUTION *****

BE CAREFUL NOT TO HURT YOURSELF OR TO DAMAGE THE EQUIPMENT.

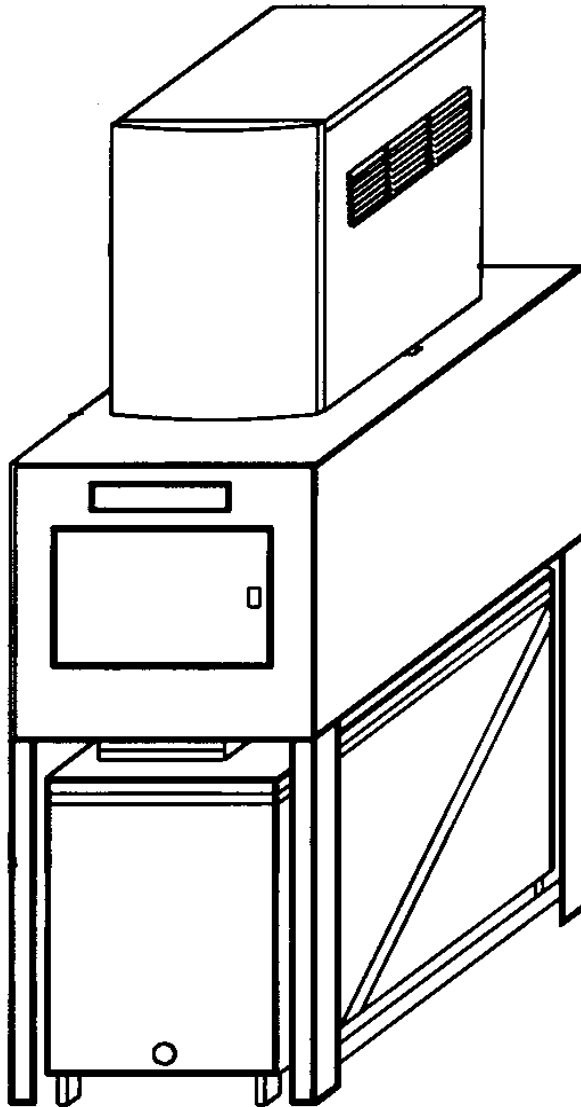
FOLLOW INSTRUCTIONS.

***** CAUTION *****

Installation Drawings

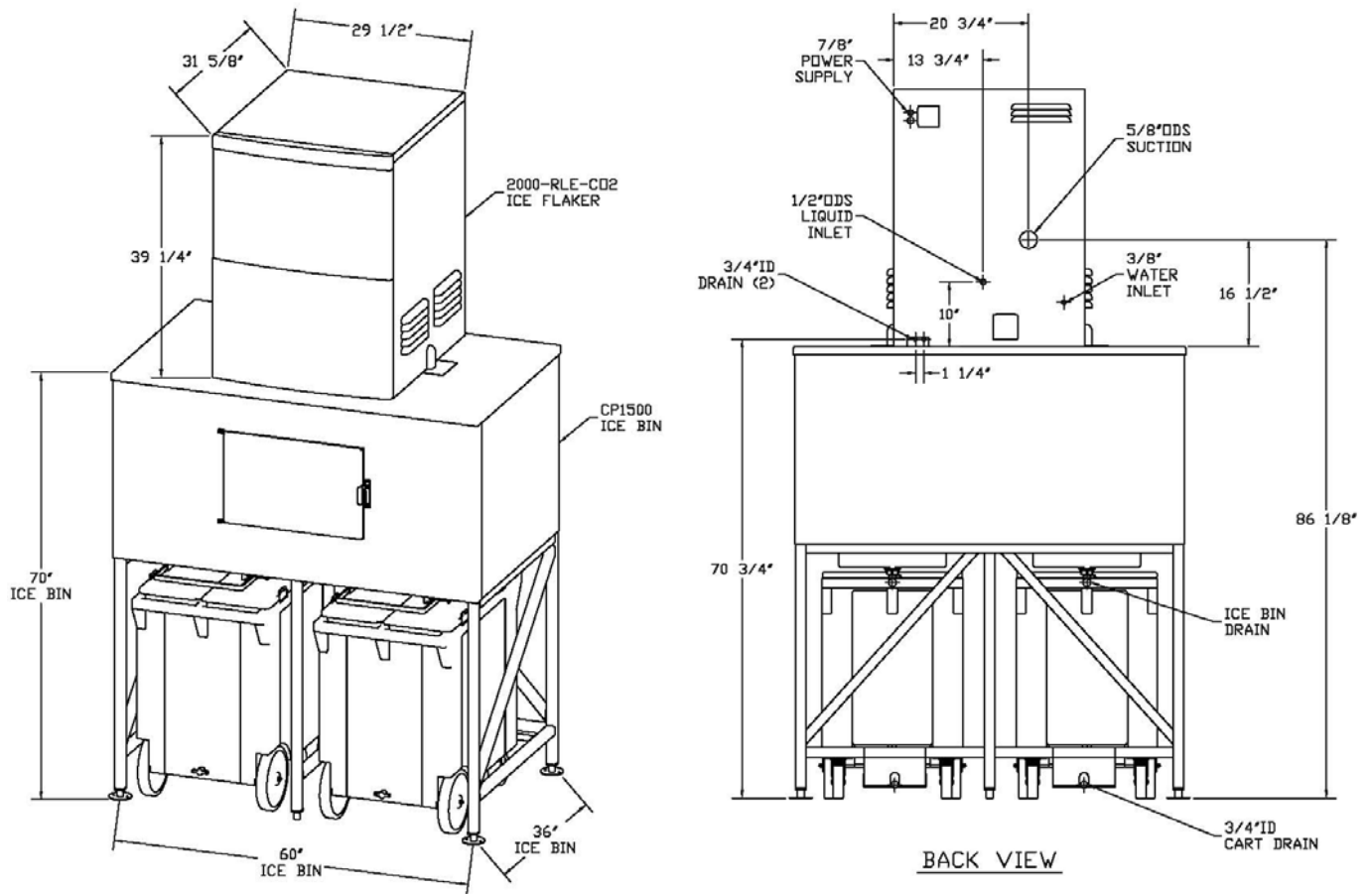
Introduction

TYPICAL INSTALLATION DRAWING (Exhibit 1)



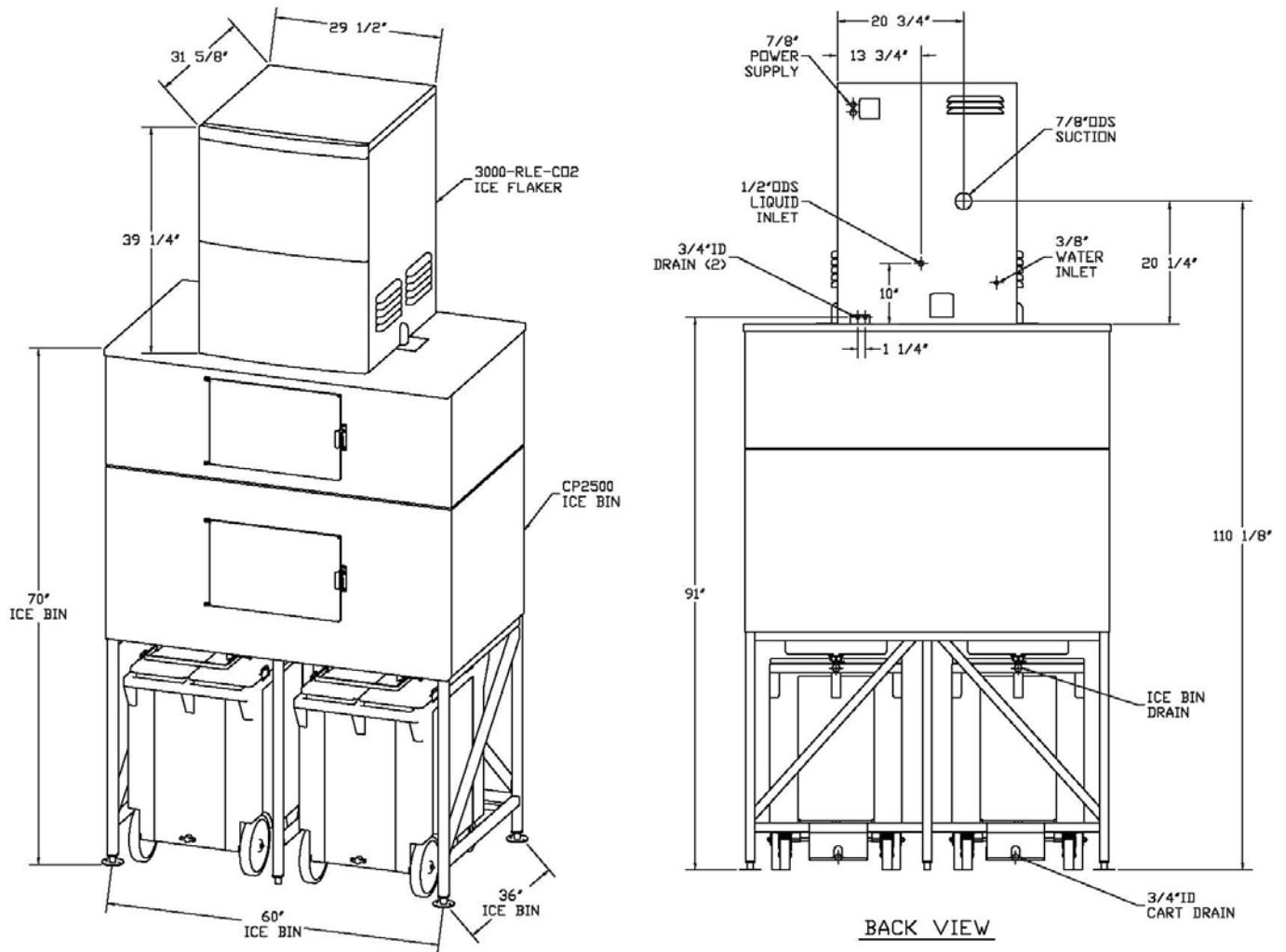
Introduction

ASSEMBLY DRAWING 2000RLB 2000-RLE-CO₂ Flaker & CP1500 Mobile Express Bin (Other models similar) (EXHIBIT 2)



Introduction

ASSEMBLY DRAWING 3000-RLB 3000-RLE-CO₂ Flaker & CP2500 Mobile Express Bin (Other models similar) (EXHIBIT 3)



Receiving & Inspection of Equipment

***** CAUTION *****

Only service personnel experienced in refrigeration and qualified to work with high voltage electrical equipment should be allowed to install or service this Rapid Freeze® Ice Flaker.

***** CAUTION *****

Upon receipt of your Rapid Freeze® Ice Flaker, you should first inspect the carton very carefully to determine if any damage may have occurred during shipment. If you suspect any damage has occurred, it should be noted immediately on the freight bill. In addition, a separate written notice must be sent to the agent representing the freight carrier. The written notice should request an inspection by the agent to verify damage during shipment. If the damage was noticed after uncrating of the carton, it is necessary to keep the original shipping container so the carrier's agent can investigate the damage claim thoroughly.

If a repair is necessary for the Rapid Freeze® machine, you must first obtain written permission from the factory before beginning any repairs. Unauthorized work on your Rapid Freeze® Ice Flaker could result in voiding the machine's warranty.

Remote low side (RLE) units are shipped with a holding charge of dry nitrogen to insure the evaporator is kept clean and moisture free. They must be pumped down and evacuated after they are connected to the rack system, before the entire rack system is charged with refrigerant.

Immediately upon receipt of equipment, before placement or installation of equipment, verify the electrical, and refrigerant configuration are correct as ordered. If any discrepancies are found, notify Howe Corporation immediately prior to any installation.

Installing the Rapid Freeze Flaker

Installation Conditions

Rapid Freeze® Ice Flakers are designed to operate in ambient temperatures warmer than 50°F (10°C). Do not install ice Flaker(s) in refrigerated cold rooms or in areas where the ambient temperature is lower than 45°F. If installed in cold ambient conditions, it is necessary to supply the ice Flaker with warmer water of at least 60°F (15°C) through a water mixing valve.

When a combination of cold water and cold air temperature exists, the water mixing valve must be used. Failure to do so will cause the lower water collecting trough and sump to ice up to the extent that the water may overflow into the ice storage bin in addition to blocking the water inlet to the pump.

*** CAUTION ***

NEVER install an ice flaker in a COLD room below 45°F (7°C). The ice flaker warranty is void if the ice flaker is installed in a cold room or outside where the ambient temperature may drop below freezing.

*** CAUTION ***

Optimum surrounding air temperature range.....60°F (15°C) to 95°F 35°C)
Minimum air temperature.....50°F (10°C)
Maximum air temperature.....100°F (38°C)
Optimum water temperature range.....60°F (10°C) to 80°F (25°C)
Minimum water temperature (without water mixing valve).....50°F 8°C)
Minimum water temperature (water mixing valve must be used).....36°F (4°C)
Maximum water temperature.....90°F (32°C)

Refrigeration Requirements

Flaker Model	Refrigeration Requirements*	Evaporator Temp Range
2000-RLE-CO ₂	18,000 BTU/hr	- 15°F to -20°F
3000-RLE-CO ₂	27,000 BTU/hr	
4000-RL-CO ₂	34,100 BTU/hr	
6000-RL-CO ₂	51,150 BTU/hr	

*Refrigeration requirements are based on operating the ice flaker with 70°F supply water, and 90°F Ambient air conditions. Refrigeration requirements and / or capacity may change with temperatures outside these conditions.

Drain Systems

All drains are of the gravity type, and must have a minimum of 1/4" per foot pitch towards the building floor drain. The use of a vent at the top of the drain line will ensure that the system will drain properly.

Installing the Rapid Freeze Flaker®

Installation on Ice Storage Bins

Rapid Freeze® Ice Flakers are designed to run smoothly and without vibration. Howe Mobile Express ice storage systems are designed to handle the weight of a RLE model ice flaker without any additional bracing. *It is recommended that the installer contact manufacturer before any other ice flaker is placed on top of a bin.*

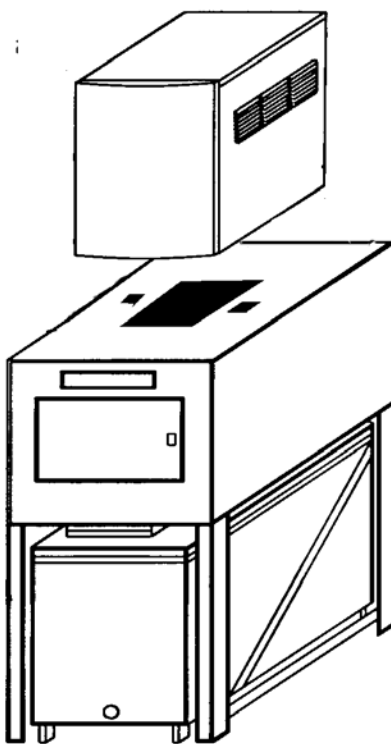
Allow for a MINIMUM OF 6" clearance on top of the ice flaker for removal of the speed reducer, and sufficient space around the unit (approximately 3 feet) for inspection and service.

Recommended Installation Procedure of Ice Machine, Ice Level Control and Drain lines

Locate and set the bin on a solid surface. If the surface is uneven you can level the system by extending the feet until the bin is leveled. Once the bin is set in place and leveled, the Rapid Freeze® ice flaker can be placed on top of the storage bin.

When location and placement of the ice machine and storage bin are considered, a floor drain should be located near or under the units to adequately remove any water from the floor caused by cleaning the equipment, or spillage of ice while emptying or transferring ice from bin.

INSTALLATION ON BIN (EXHIBIT 4)



Installing the Rapid Freeze Flaker

- 1) Remove front panel of ice flaker by lifting up and away from unit and place aside until all connection and adjustments are made.
- 2) Remove top cover of ice flaker by lifting straight up, and set aside with front cover. (Cover is removed for easy access when installing and connecting refrigeration lines).
- 3) With two people or forklift, position ice flaker on to storage bin. Be careful to locate bottom frame of flaker over raised portion of ice bin drop zone so ice machine is centered correctly.

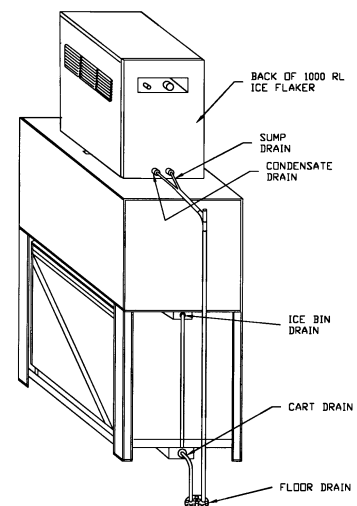
- 4) On the bin top, remove mounting screws & eye box covers, and set aside with front cover. Ice level sensors are mounted in the eye boxes on the bin top, (one on the left and right side of ice machine) Locate cables from ice level sensors and route under protrusions on sides of flaker enclosure. Reach into the front of flaker and pull cables to front of unit. Leave enough slack to form drip loop on the cable in the eye box. Eye boxes should remain dry & free from moisture to eliminate potential problems.



- 5) Notice that cables have a spaded plug connection. Locate similar cables with spaded plug connection, which protrude from channel of enclosure frame and attach respective plugs from each sensor to its corresponding plug. ***See note on next page regarding Di-electric grease*** When power is provided and flaker is turned on, ice machine and ice level control will be operational. (refrigeration must be piped, and charged for flaker to make ice).



- 6) Re-install side panels (if removed) and top cover
- 7) Install lower drain pan on rear cross member of bin stand. This is behind mobile ice cart.
- 8) Install drain line from upper (horizontal slide door) and lower (mobile ice cart) drain pans.
- 9) **Install drain line from flaker condensate and overflow connections located on rear panel of ice machine. Be sure to follow local plumbing codes to prevent back flow. If not installed, water may migrate into the eye boxes.**
- 10) Run all drain lines in rear of ice bin to floor drain.



Installing the Rapid Freeze Flaker

E20T104 and E20T105 Photo Eye Moisture Prevention Instructions



1. Pack Molex plug(s) with dielectric grease prior to installation.
2. Re-pack any time Photo Eye is unplugged to maintain moisture resistance.
3. Use dielectric grease only.
4. Hold connectors to connect / disconnect. **DO NOT PULL BY CABLE.**

REMOTE LOW SIDE (RLE) MODEL INSTALLATION

*** CAUTION ***

Electrical wiring should be performed by qualified technicians following Local Electrical codes.

*** CAUTION ***

Wiring and Electrical Connections

The electric controls are mounted inside the enclosure (under the metal cover) for easy access to controls.

- 1) Install disconnect (not supplied by factory) and connect power lines 208-230/1/60 to the two black wires marked L1 and L2 in the electric junction box on the rear of the flaker.
- 2) The yellow wires in the junction box are to be connected to the solenoid valve coil, mounted externally to the flaker.
- 3) In the electric wiring junction box on the rear of the flaker there are two red wires tied together with a wire-nut. *When connecting to a rack system leave these wires tied together.*
- 4) If not connected in previous section, locate & connect the photo eye sensors to the matching plug in the ice flaker.

Installing the Rapid Freeze Flaker

Piping

The ice flaker as supplied by Howe Corporation was thoroughly cleaned and dehydrated at the factory. Foreign matter may enter the system by way of the field piping. Therefore, care must be used during installation of the piping to prevent entrance of foreign matter.

Install all refrigeration system components in accordance with applicable local and national codes in conformance with good practice required for the proper operation of the system.

The following procedures should be followed:

- a. Do not leave dehydrated equipment or lines open to atmosphere any longer than is absolutely necessary.
- b. Use only clean new refrigeration grade copper tubing.
- c. Suction lines should be sloped $\frac{1}{4}$ " per 10 feet towards the compressor.
- d. Suitable P-types oil traps should be located at the base of each suction riser of four (4) feet or more to enhance oil return to the compressor.
- e. When brazing refrigerant lines, an inert gas should be passed through the line at low pressure to prevent scaling and oxidation inside the tube. Dry nitrogen is preferred.
- f. Use only a suitable silver solder alloy on suction and liquid lines.
- g. Limit the soldering paste or flux to the minimum required to prevent contamination of the solder joint internally. Flux only the male portion of the connection, never the female. After brazing, remove the excess flux.

The size of the suction and liquid line should be the same as the connection size on the ice flaker provided that the runs are not longer than 150 feet.
(Refer to table below for line sizing)

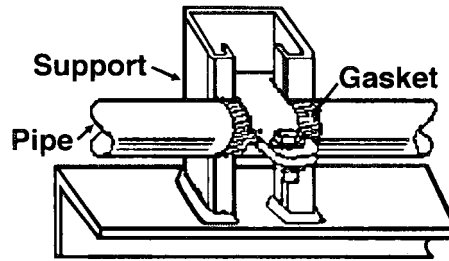
TABLE 1

MODEL	MINIMUM SUCTION RETURN LINE	MINIMUM LIQUID LINE
2000-RLE-CO ₂	5/8" ODS	1/2" ODS
3000-RLE-CO ₂	7/8" ODS	
4000-RL-CO ₂	1-1/8" ODS	
6000-RL-CO ₂	1-1/8" ODS	

REFRIGERANT PIPING SUPPORT

Installing the Rapid Freeze Flaker

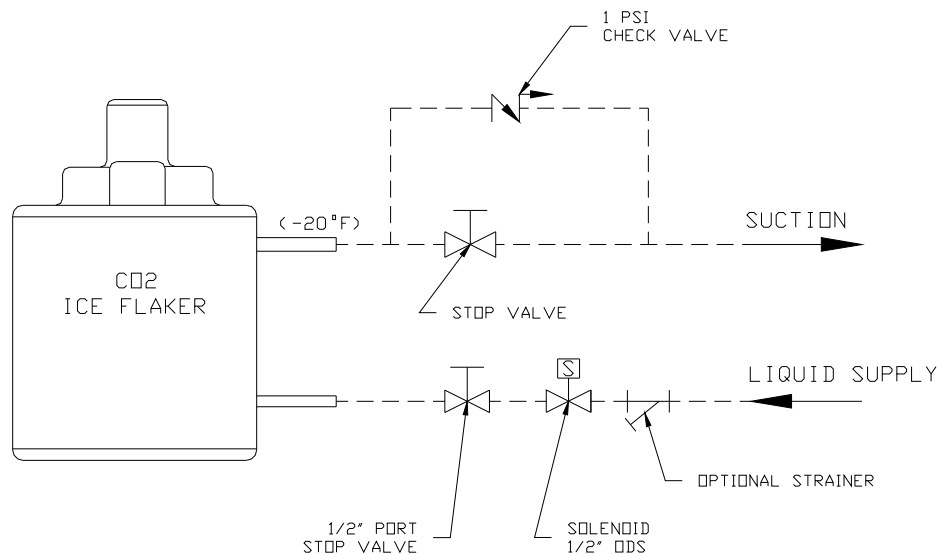
Example of Pipe Support



1. Normally, any piping straight run of tubing must be supported in at least two locations near each end of the run. Long runs require additional supports. The refrigerant lines should be supported and fastened properly. As a guide, 3/8 to 7/8 should be supported every 5 feet; 1-1/8 every 7 feet.
2. When changing directions in a run of tubing, no corner should be left unsupported. Supports should be placed a maximum of 2 feet in each direction from the corner.
3. Piping attached to a vibrating object (such as a compressor or compressor base) must be supported in such a manner that will not restrict the movement of the vibrating object. Ridged mounting will fatigue the copper tubing.
4. Do not use short radius ells. Short radius elbows have points of excessive stress concentration and are subject to breakage at these points.
5. Thoroughly inspect all piping after the equipment is in operation and add supports wherever line vibration is significantly greater than most of the other piping. Extra supports are relatively inexpensive as compared to refrigerant loss.

REFRIGERANT PIPING (EXHIBIT 5)

Installing the Rapid Freeze Flaker



NOTES:

DASHED LINES INDICATE FIELD PIPING.

MODEL	SUCTION LINE STOP VALVES (ODS)	LIQUID LINE VALVES (ODS)	FLOW RATE (lb/hr)	LIQUID SOLENOID ORIFICE
2000-RLE-CO ₂	7/8"	1/2"	300	3/16"
3000-RLE-CO ₂	7/8"	1/2"	400	3/16"
4000-RLE-CO ₂	1-1/8"	1/2"	600	3/16"
6000-RLE-CO ₂	1-1/8"	1/2"	900	9/32"

USE HIGH PRESSURE RATED VALVES

Line Insulation

After the final leak test, refrigerant lines should be insulated to reduce heat pick-up and prevent the formation of flash gas in the liquid line. Refrigerant lines should be insulated with Armstrong "Armaflex" or equivalent. Any insulation located in outdoor environments should be protected from UV exposure to prevent deterioration of insulating value.

Water Line

Installing the Rapid Freeze Flaker

Connect a 1/2" galvanized or 1/2" ODS COPPER water pipe from the closest convenient water line to within 2 to 4 feet of the rear of the ice flaker. Install a water line shutoff valve near the ice flaker. Use 3/8" OD copper tubing between the field-supplied water valve & water inlet connection located on the rear of the flaker. This line should be as short as possible to avoid pressure drop.

If water supply has silt or sand in it, a coarse water filter is recommended.

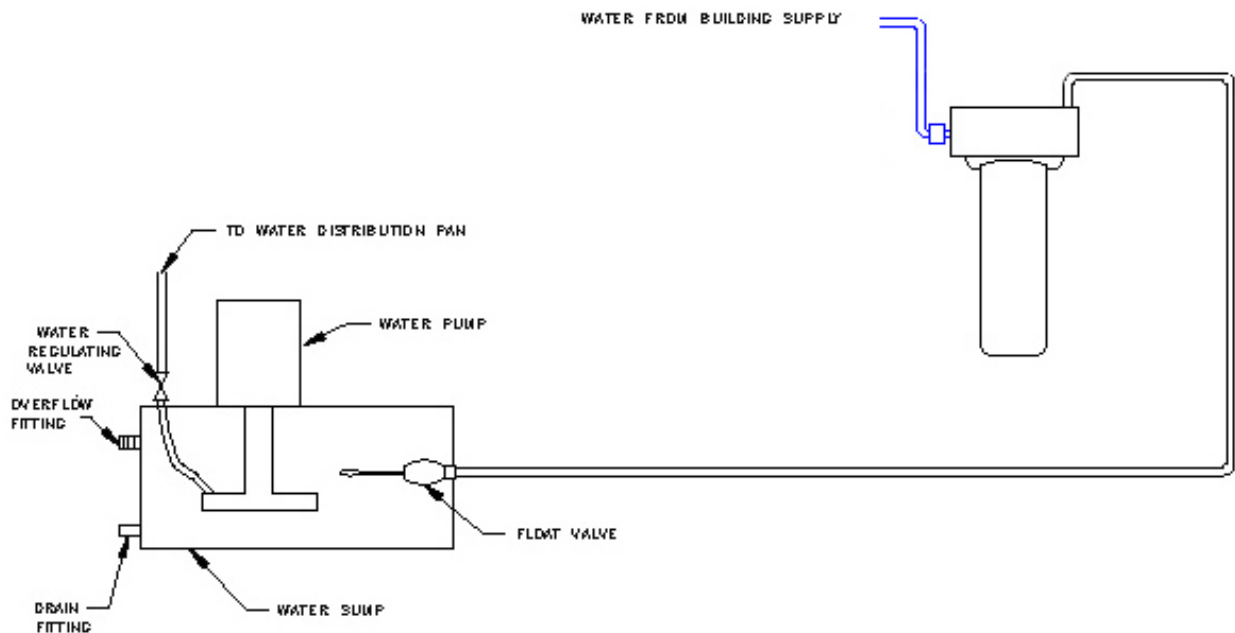
*** IMPORTANT NOTICE ***

A MINIMUM WATER PRESSURE OF 20 PSIG IS REQUIRED AT THE ICE FLAKER FLOAT VALVE TO INSURE ADEQUATE WATER FLOW.

MAXIMUM WATER PRESSURE TO THE FLOAT VALVE IS 60 PSIG.

*** IMPORTANT NOTICE ***

WATER SUPPLY & FILTER CONNECTIONS (EXHIBIT 6)



Installing the Rapid Freeze Flaker

Refrigerant Charging

***** CAUTION *****

Service/Installation personnel **MUST** have knowledge of refrigeration systems to properly charge this ice flaker.

***** CAUTION *****

***** WARNING *****

All Rapid Freeze® RL model ice flakers are shipped with a small holding charge of dry Nitrogen.

SYSTEM MUST BE EVACUATED PRIOR TO CHARGING REFRIGERANT.

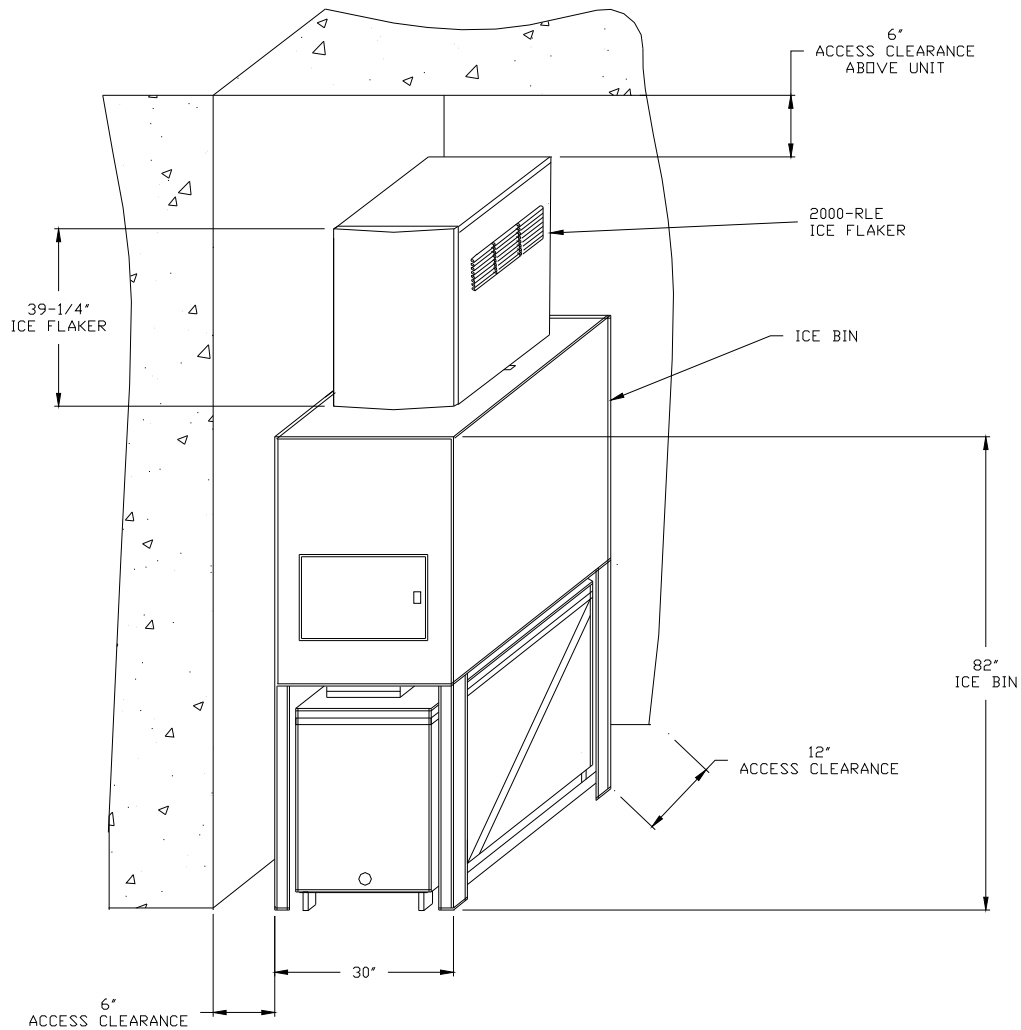
***** WARNING *****

Follow accepted practice and procedures to charge refrigerant into the system.

Consult the rack or condensing unit manufacturer for full details.

Installing the Rapid Freeze Flaker

LOCATION DRAWING FOR RLB MODEL (EXHIBIT 7)



Installing the Rapid Freeze Flaker

HOW THE RAPID FREEZE® FLAKER OPERATES

The Howe Rapid Freeze® ice flakers operate on a continuous pump-down refrigeration system. When set up as a split system, remote low side ice flaker, & remote high side condensing unit, the system is set up to operate as follows. The main power is to be on at all times for the ice flaker control panel, and the condensing unit. When the ice level control calls for ice, the drive motor, water pump and solenoid valve are all energized simultaneously, as the ice level in the storage bin raises & blocks the signal from the emitter to the receiver, the solenoid valve will de-energize, initiating the pump-down sequence. The drive motor & water pump will continue to run until the off delay cycle time expires, once the preset time expires, the drive motor & water pump will shut off. The time delay period is typically adjusted to approximately 5-10 minutes after the flaker stops making ice. This allows the evaporator to warm up, so when the blade stops, it will not run the risk of freezing to the evaporator if ice is still on the evaporator.

WHY ICE BIN THERMOSTATS ARE NOT USED

The use of a bin thermostat is not recommended and not permitted. The Rapid Freeze® ice flaker is designed so that the freezing drum (operating @ -20°F) is located directly over the ice drop opening in the bin. This large opening permits cold air to cascade off the evaporator down into the bin. Since the air temperature in the bin is equal to or lower than the ice temperature, the set point of the thermostat cannot be adjusted to where it can reliably distinguish temperature difference upon contact with ice.

In most cases when deflector damage is reported, investigation has shown that a thermostat was used as a bin level control device. The photo eye ice level control physically sense the presence of ice rather than sensing temperature.

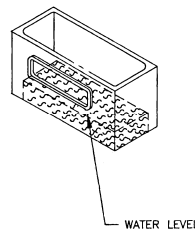
Start and Adjust

Once installation has been completed, and the ice Flaker has been properly evacuated, and charged with refrigerant, you may proceed with the Start and Adjust section.

Checklist

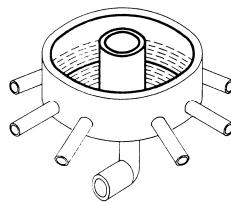
- 1) _____ Before power is turned on, open inlet water valve, (field supplied & installed near the back of the Ice Flaker), and check water level in sump. The water level in the sump is the same as the return trough, it should be about half full. (See below)

(EXHIBIT 8)



- 2) _____ Make sure the On-Off switch is in the Off position, then turn on the main disconnect.
- 3) _____ Check voltage between line 1 and line 2, verify that it is within nameplate ratings.
- 4) _____ Turn the On-Off switch ON. Solenoid valve will click loudly, and motor & pump will start .
- 5) _____ As the drive motor & water pump are energized, water is delivered to the distribution pan located inside the evaporator.
- 6) _____ Looking down inside the evaporator through the hand hole access cover, verify that the distribution pan water level is maintained at the half full point. If it is too low then the water regulating valve needs to be opened slightly. If the water level is too high, then the regulating valve must be closed accordingly. Continue opening or closing the adjustment valve until the water level is maintained at the proper level. (see below)

(EXHIBIT 9)



- 7) _____ After a few minutes, the ice maker will begin to freeze the water circulating over the evaporator into ice.
- 8) _____ Allow 10-15 minutes to let the ice flaker come down to temperature and balance out.

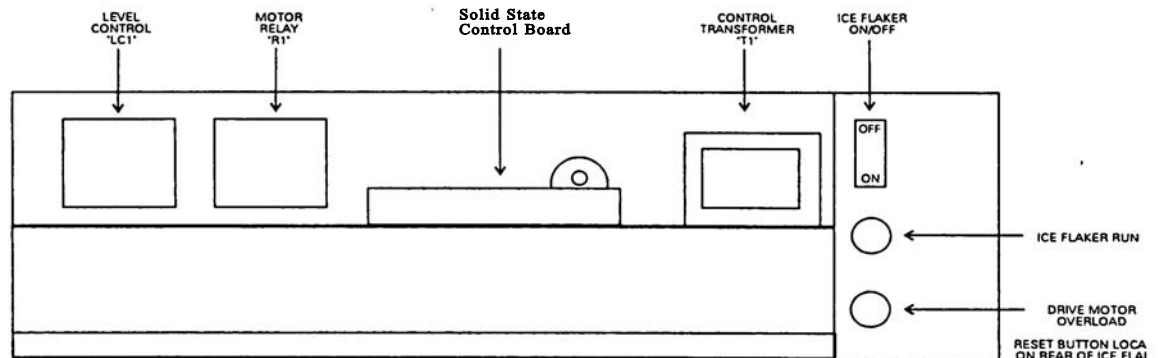
Start and Adjust

- 9) _____ Looking down into the evaporator, through the hand hole cover, check to make sure the ice is being frozen and harvested over the entire surface of the evaporator. If it is not, check the suction temperature at the ice machine. Suction temperature must be maintained between -15°F and -20°F.
- 10) _____ Liquid line must have unrestricted flow at all times for proper performance of ice flaker. On ice flakers connected to a rack system, liquid line should be connected directly to the receiver, before any defrost restricting valves.
- 11) _____ If suction temperature is correct and ice is not being frozen and harvested on the entire surface of the evaporator, then
- 12) _____ When the ice maker is adjusted and operating properly, turn off the on-off switch, or block the electric eye beam path. (The electric eye control has a 15 second delay before it's output opens). When the output opens, or when the on-off switch is opened the shutdown sequence is initiated. (de-energize the solenoid valve, and start the off delay cycle for the drive motor & water pump).
- 13) _____ Ice flaker is pumped down, (solenoid valve is de-energized) drive motor & water pump continue to run until the off delay cycle opens. Field adjustable between 1-30 minutes, normally set at approximately 5-10 minutes.
- 14) _____ Electronic overload set point is factory set to trip and shut the flaker off when the motor reaches an overloaded condition.
- 15) _____ Ice maker is adjusted and producing dry flakes of ice.
- 16) _____ Water is NOT flowing into the bin. If it is, locate source and correct it.
(i.e.: distribution pan overflowing, water recovery trough overflowing, or distribution tubes broken or misaligned.)

Start and Adjust

Components & Functions

ELECTRICAL CONTROLS FOR ICE MAKER (EXHIBIT 10)



- 1) **Drive Motor Contactor / Relay**
Provides power to the drive motor & water pump. Energized during freezing and pumpdown cycle, then timed off for shut down. Auxiliary contact provides power to the liquid solenoid valve when contactor is energized. **NOTE: The red button on the relay is a manual override button, when depressed (by pressing the red button, or raising the lever below it) the relay contacts will engage, even when the contactor/relay coil is NOT energized.**
- 2) **Control Transformer**
Provides 24 Volt control power to control panel components, Solid State Control Board, motor contactor, and indicating lights.
- 3) **Solid State Control Board (E20T48)**
Main control processor, incorporates motor overload, operating circuit, off- delay circuit. Controls motor contactor and solenoid valve power.
- 4) **Photo Eye control relay**
processes signals from electronic eye level control, has built in time delays. Shuts machine off when ice bin is full to prevent damage to the flaker from ice backing up into the evaporator section.

Panel Mounted Items

- 1) **Ice Flaker run light** - Green light is on whenever the contactor and drive motor is energized.
- 2) **Motor overload light** - Amber light is on whenever the electronic overload opens, to stop the drive motor & pump.
- 3) **Overload reset button** - Normally open reset button, resets overload circuit following overload condition. *Located on Rear of Ice Flaker.*

Start and Adjust

- 4) On-Off Switch - Main on-off switch for control circuit. Wired in series with Photo Eye Ice level control.

E20T48 Solid State Control Board

The E20T48 Solid State Control Board is the main processor for the ice Flaker control panel. It incorporates the timer functions, control relay functions, and overload relay functions

Terminals 1 & 2:

24 VAC input power.

Terminal 3:

Ice Flaker Run input signal (all on-off switches, ice level controls and any special controls installed must be in this circuit.)

Terminal 4:

Overload reset input (Normally Open, momentary contact)

Terminal 5:

Motor overload output (for overload indicating light) energized upon overload condition, stays on until overload is manually reset.

Terminal 6:

Ice Flaker contactor output (Output is energized when input signal is present, & control is not in overload condition.)

When input signal is removed (switch or ice level control open) timer circuit is started, output will stay energized until timing circuit releases output.

Output is de-energized immediately upon overload condition

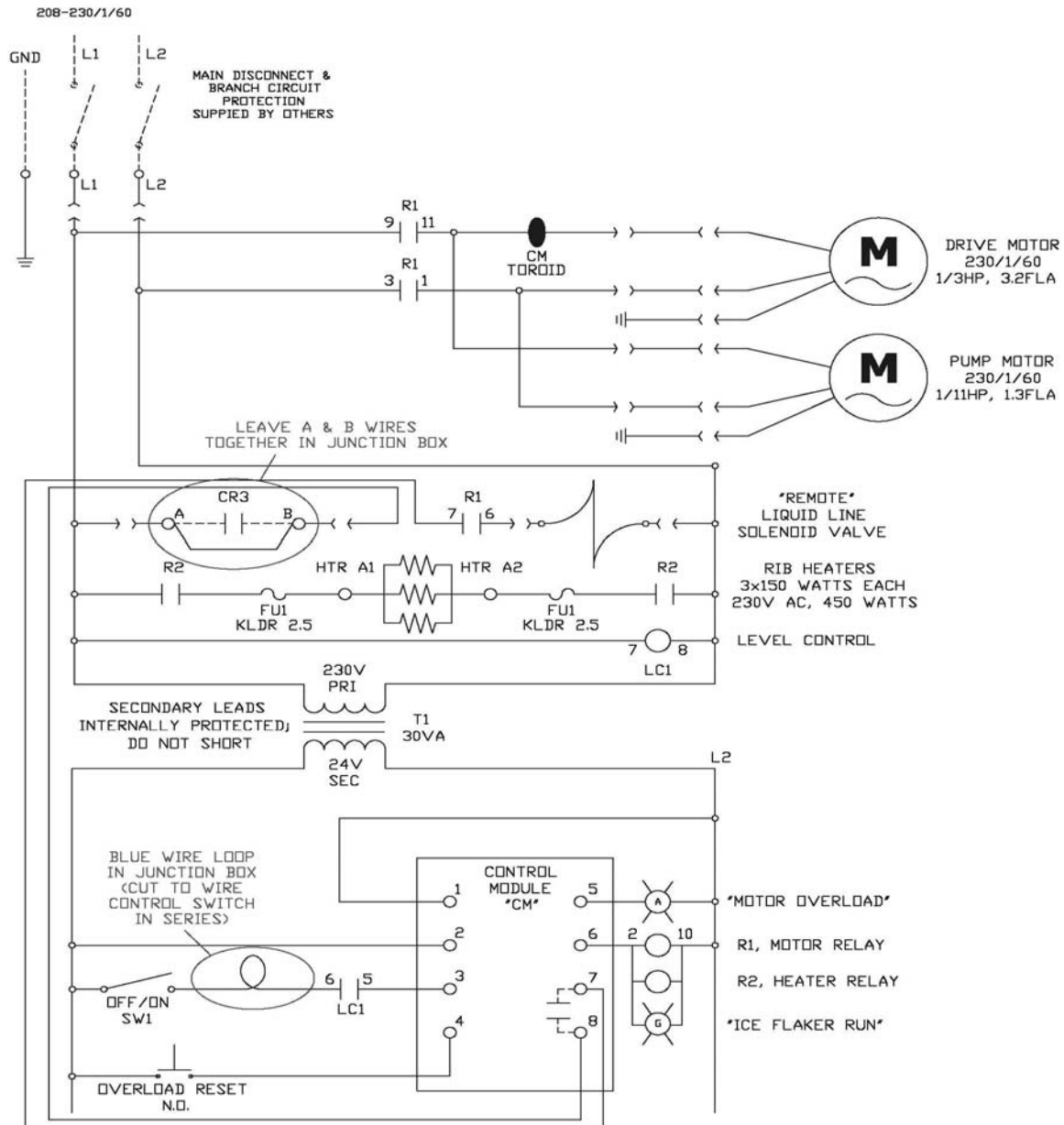
Terminals 7 & 8:

Isolated output contacts for liquid solenoid valve. (Normally Open)

Contacts close immediately upon input signal (#3), stay closed until input # 3 signal is removed. Contacts open when input signal (#3) is removed, or when overload condition exists.

Wiring Diagrams

WIRING SCHEMATIC # WS-140-HTR
(EXHIBIT 11)



CM = Solid State Control Board

LC1 = Level Control

R1 = Drive motor & Water pump Relay/contactors

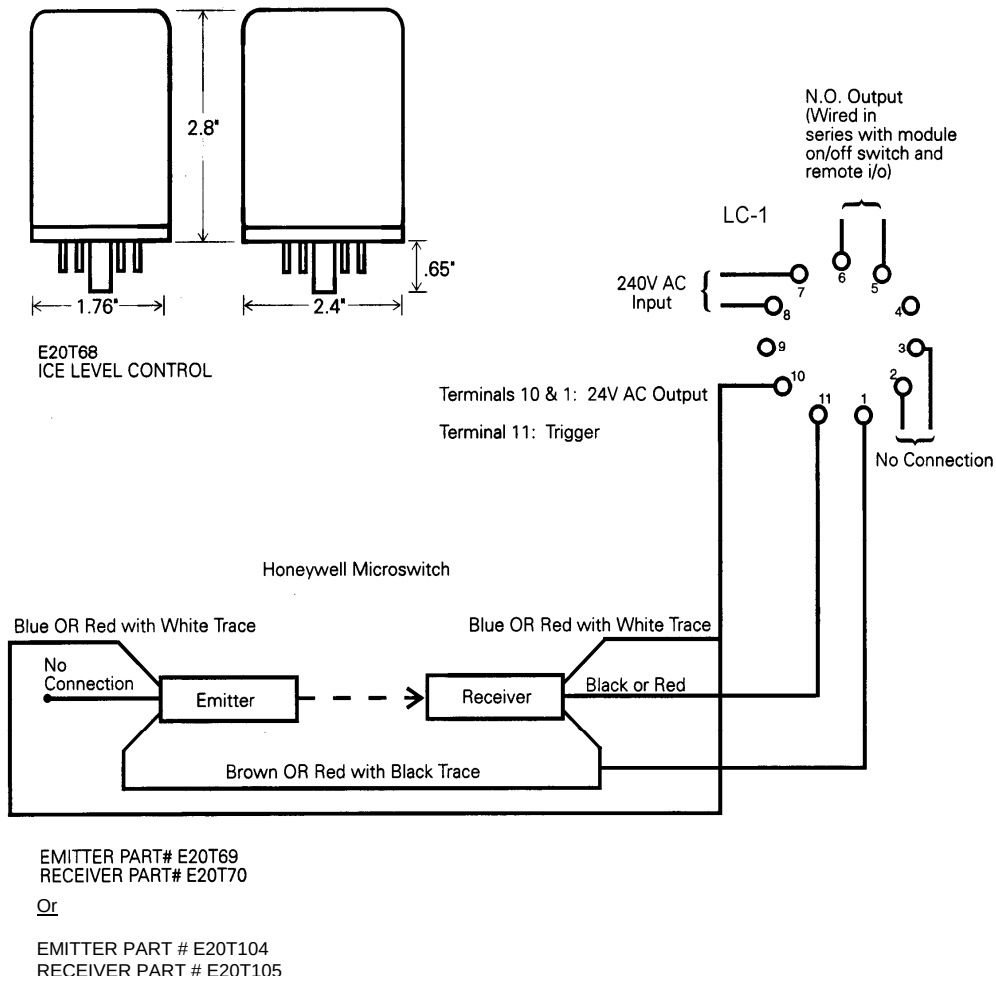
CR3 = Isolating relay when for remote condensing unit. Not applicable for CO₂ flakers.

* When connecting to a rack system, A & B wires are to remain wire-nutted together. (A & B wires are located in the power junction box on the rear of the flaker).

Remote liquid solenoid leads in junction box.

Wiring Diagrams

PHOTO EYE CONTROL WIRING (EXHIBIT 12)



Important!

It is important to ensure that there is a “drip loop” on the cables near the rear of the photo eye sensors, to allow any moisture to travel to the bottom of the drip loop to drip off, thereby not accumulating at the rear of the sensors.

Maintenance

Evaporator

To keep the evaporator in peak performance, the ice maker should be cleaned with an approved ice machine cleaner at least twice a year, more often if water conditions cause mineral build up, using an approved food grade ice machine cleaner. The water pump is used to circulate ice machine cleaner through the system. Refer to cleaning instructions for complete cleaning instructions.

Ice Machine Cleaning Instructions

An important part of ice flaker maintenance is to clean it frequently so that the water passages are not clogged and the freezing surface is clear and free of scale caused by calcium and iron deposits.

Frequency of cleaning depends upon the quality of water. In extreme hard water areas, it may be necessary to clean the flaker as often as every 2 months whereas in normal or "soft" water areas twice a year may be sufficient.

When cleaning is necessary, proceed as follows:

*** CAUTION ***
ICE MACHINE CLEANERS CONTAIN ACIDS AND MAY CAUSE BURNS. HANDLE WITH CARE IN CASE OF EXTERNAL CONTACT, FLUSH WITH WATER. IF SWALLOWED, DO NOT INDUCE VOMITING. GIVE LARGE AMOUNT OF MILK OR WATER. RINSE MOUTH WITH WATER • SEEK IMMEDIATE MEDICAL ATTENTION!.
USE APPROVED ICE MACHINE CLEANER ONLY. MIX SOLUTIONS PER MANUFACTURERS INSTRUCTION.
*** CAUTION ***

1. Turn off refrigeration. If flaker is connected to a compressor rack, close the liquid line shut off valve, turn off the ice flaker switch. Adjust the off delay time adjustment fully clockwise to allow refrigerant pump out.
2. Remove all ice in storage bin.
3. Close water supply shut off valve.
4. Drain water from drain connection in water sump. Some models are equipped with a drain valve, others have a drain plug, located below the water float valve connection.
5. Prepare the cleaning solution: Mix 8 oz. of Howe ice machine cleaner (Howe part # E10V1) with 3 quarts of hot water. Water should be between 90-115°F. If using an alternate ice machine cleaner (such as Virginia cat no.418) follow instructions on bottle. Mix 8 oz. of Virginia ice machine cleaner with 2 gallons of water.
6. Pour solution of ice machine cleaner into sump, to normal operating level. Do not overfill because it may overflow into bin.

Maintenance

7. Start the ice flaker drive motor and water pump by turning the switch on, then immediately off. This will allow the gear motor & water pump to run for approximately 30 minutes with out refrigeration, to circulate cleaning solution over the freezing surface and all water passages. Operate until all scale is removed. This may require from half hour up to about 2 hours if scale build up is heavy.
8. When system is clean, drain cleaning solution and rinse with 2 or more complete rinses to insure that cleaning solution is flushed away thoroughly. At each rinse, fill sump with fresh water and run drive motor and water pump for 10 minutes, then drain.

Water Distribution Tubes

Water distribution tubes should be kept clean and free of any mineral buildup. When they do accumulate mineral deposits, the flaker must be thoroughly cleaned. Remove each tube and clean with cleaning solution and small tubing brush. Carefully inspect each distribution tube and fitting for leaks or crack. Replace defective tubes when necessary.

Water Sump

Water sump and pump should be kept clean and free of any mineral buildup. When mineral deposits accumulate the machine must be thoroughly cleaned. The water sump will be cleaned when you normally clean the equipment by circulating the ice machine cleaner through the water system, upon completion of cleaning process, open water sump drain valve and flush out the sump assembly.

After flushing & Sanitizing, close drain valve to resume normal operating conditions. In extreme cases of mineral or slime buildup, shut off the main power and remove the top covers from the sump, using the ice machine cleaner and a scrub brush clean the plastic sump body until the deposits are loosened and flushed out through the sump drain fitting as described above

Ice Machine Condensate Drip Pan

The ice machine condensate drip pan should be cleaned each time the ice flaker is cleaned. The pan should be wiped clean to remove any mineral or slime deposits. The drain line should also be flushed to allow condensate to drain freely from the drip pan.

TO SANITIZE:

1. Mix 16oz. of household bleach with 1 gallon of water.
1a. As an alternate method, mix a solution of approved sanitizer (Howe part # E10V31) Follow instructions on bottle.
2. Pour solution into sump, to normal operating level (as in #6), then re-circulate sanitizing solution for approximately 20 minutes, by turning on drive motor & pump.
3. Drain solution and rinse thoroughly with fresh water at least twice, following procedure described in No.8.
4. After ice flaker is thoroughly rinsed, return machine to normal operation by opening water supply valve, readjusting off delay timer setting to previous set point, and restoring refrigeration by turning the machine back to ON.

Maintenance

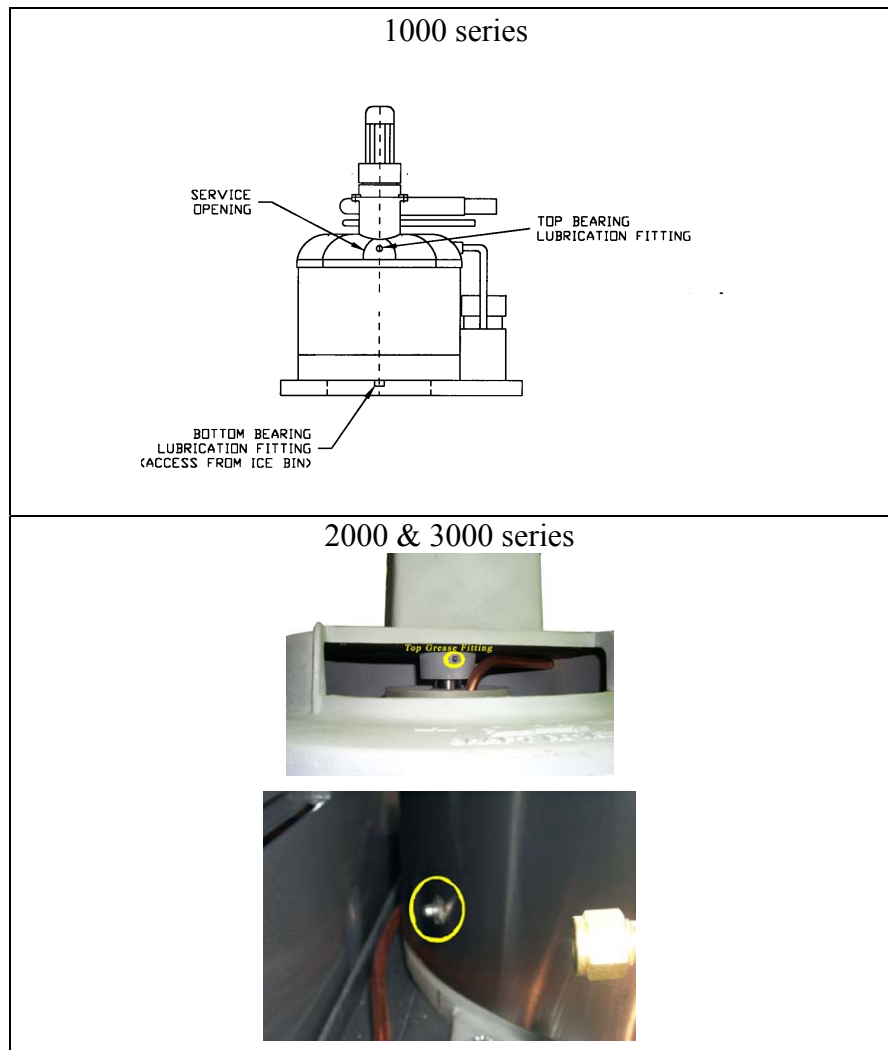
Lubrication

Bearings & Seals

Main Bearings on the Ice Flaker are oilite and have grease fittings for both top & bottom bearings. The top bearing is accessed through the hand-hole cover, the bottom bearing is greased via a grease fitting located on the center hub accessed from the ice bin. The main bearings should be greased annually using a U.S.D.A. approved food grade edible grease.

Use caution to ensure the bearing is not over-greased. Typically only one squirt of the grease gun is required, (or until you feel resistance on the pump) to grease the bearing(s).

Over-greasing may “pop” the seal out of its normal position. If over-greased and the seal is popped out of position, the excess grease will need to be removed prior to re-installing the seal. If seal is damaged due to over-greasing, the seal may need to be replaced.



Maintenance

Preventative Maintenance

Preventative maintenance means that the store or department manager (or a delegated employee) make a daily visual check of the ice flaker.

Check for...

- Bin doors are working (closing) properly
- Bin doors are kept closed
- Photo eyes and brackets are in proper alignment
- Ice Quality (Size of flakes)
- Ice Quantity (Normal amounts of ice produced)
- Bubbles in sight glass
- Overall cleanliness of the flaker
- Any unusual noises.

When these items are checked on a daily basis, any change will be easily detected prior to any service call for a malfunction of the machine.

Preventative Maintenance Schedule

	6 Month	12 Month	24 Month	36 Month	48 Month	60 Month
Replace water filter cartridge*	•	•	•	•	•	•
Grease main bearings**		•	•	•	•	•
Clean & sanitize ice machine (as required***)		•	•	•	•	•
Check if flaker is harvesting properly		•	•	•	•	•
Check for bubbles in sight glass		•	•	•	•	•
Clean electric eyes / check alignment		•	•	•	•	•
Inspect flaker for damaged parts ****		•	•	•	•	•
check bearing wear		•	•	•	•	•
check cutter blade clearances		•	•	•	•	•

* Replace water filter every 6 months.

** Use Caution to not over grease which may “pop” the grease seal.

*** Typically every 12 months, in areas with poor water quality, possibly as often as every few months. With good quality water, cleaning may be required only once a year.

**** Parts to check for damage are: ice deflector, ice deflector scraper, squeegee & wrapper, water distribution tubes and float valve.

Troubleshooting Procedure for Operation of E20T73 Photo Eye Ice Level Control

For Photo Eye Level Control sensors supplied with RLE Flaker Models with integral control panels – attached with cables using Molex connectors.

When checking Molex plugs

Hold connectors to connect / disconnect. **DO NOT PULL BY CABLE.**

Step 1 –CHECK FOR WATER OR MOISTURE IN MOLEX PLUG. If the Molex plug for either the emitter, or receiver is wet or has moisture in it, shake water off plug and dry properly. Pack the Molex plug(s) with Di-electric grease, re-connect & test unit. **Note: IF Molex plug is unplugged, plug must be re-packed with Di-electric grease (each time it is un-plugged) to maintain water resistance.**

Step 2 – CHECK FOR LOOSE OR SLOPPY PIN IN MOLEX PLUG. If the Molex plug is connected / dis-connected multiple times, it may cause the female pin to open slightly. Check the Female pins in the Molex plug (Ice Machine wiring harness), to ensure the pins are not opened up too much, causing a sloppy or loose connection. If pin appears to be opened too much gently close the female pin to ensure a tight fit for the male pin.

Step 3 - CHECK FOR CORRECT WIRING ARRANGEMENT. First, unplug the emitter from the wiring harness, if the plug on the emitter has three pins, then do the following. Check wiring of the **EMITTER** cable (E20T69 - about 3” long) in the control panel. This should have only the **Blue & Brown** wires connected to the **RELAY BASE** (5V013) in the control panel. **Blue** is connected to **terminal #10** and **Brown** is connected to **terminal #1**. If the **Black** wire is connected to **terminal # 11** (lightly marked the side terminal tab) of the **RELAY BASE**, this wire should be removed and isolated so it does not come into contact with any other terminal. If the emitter has only two pins in the Molex plug, the black wire does not need to be removed, provided the Molex plug is packed with Di-electric grease. Next, check wiring of the **RECEIVER** cable, (E20T70 - about 3-3/4” long) in the control panel. This should have the **Blue, Brown & Black** wires connected to the **RELAY BASE** in the control panel. **Blue** is connected to **terminal #10** and **Brown** is connected to **terminal #1**. **Black** is connected to **terminal # 11**. If not, connect as described

Step 4 - CHECK FOR CORRECT VOLTAGE. With **POWER SUPPLY RELAY** (E20T68) plugged in and power to Flaker on, check with volt meter to verify there is 24 volts across Molex spade connectors - attached to **Blue & Brown** wire for both the **EMITTER** and **RECEIVER**. Alternatively you can check **terminals #1 and # 10** on the **RELAY BASE**. If you don't have 24 volts, it is likely the **POWER SUPPLY RELAY** has failed and must be replaced.

Step 5 - CHECK FOR CORRECT OPERATION. Place a wire jumper across **Blue** and **Black** spades of the Molex plug on **RECEIVER** cable, which is attached at other end directly to **POWER SUPPLY RELAY** in control panel. The **POWER SUPPLY RELAY** should open the solenoid valve, turn the machine on and begin making ice. When the wire jumper is removed, the solenoid should close

TroubleShooting Chart

approximately 15 seconds later. Depending upon the adjustment of the off-delay timer, the driver motor and water pump will continue to operate for between 2 – 30 minutes.

A) If the machine works as described above, it is likely the switch has failed to operate properly and the **RECEIVER** must be replaced.

B) If the machine does NOT work as described above, it is likely the **POWER SUPPLY RELAY** has failed to operate properly and must be replaced.

C) If the machine works as described above, and the LED light on the back of the **EMITTER** is out or dimly illuminated, it is likely that the **EMITTER** has failed to operate properly and must be replaced.

SEQUENCE OF OPERATION. There are LED indicators on the rear of both the **EMITTER & RECEIVER**. The **EMITTER** LED is illuminated whenever the ice machine has power. The **RECEIVER** LED is illuminated when it “sees” the infrared signal from the **EMITTER**, i.e. when no ice, blocks the signal. The signal to the **RECEIVER** must to be “blocked” for 15 seconds in order for the **POWER SUPPLY RELAY** to close the solenoid valve. When the solenoid valve de-energizes, the adjustable off-delay timer keeps the drive motor & water pump running for between 2 – 30 minutes, to clear any residual ice off the evaporator.

** Emitter E20T69 and Receiver E20T70 are interchangeable with newer style Emitter E20T104 and Receiver E20T105 **

Trouble Shooting Main Control Board

Verify 24 VAC (+ - 4 VAC) between terminal 1 & 2

If ok, proceed, if not, check transformer in control panel for proper operation.

Checking Operation

Place wire jumper between terminal 2 & 3 to initiate unit start up,

Terminal 6 should energize, immediately, energizing drive motor contactor.

Terminal 7 & 8 should close immediately, allowing Solenoid Valve to energize.

Remove Jumper,

Terminal 6 should remain energized for off delay time period (1-30 minutes)

Terminal 7 & 8 should open immediately, de-energizing solenoid valve.

Checking Overload Condition

With machine operating in normal condition, slowly turn current sensing overload set-point down (counterclockwise) until red LED illuminates, continue slowly turning CCW until set point trips.

Tripping the overload set point does the following:

De-energizes output contact # 6, (de-energizes motor contactor).

Opens contacts # 7 & 8, (de-energizing solenoid valve).

Turn set point CW to point prior to trip point, reset overload and check for operation. If red LED is illuminated (and motor amps are not above normal load) turn slightly CW until LED goes out.

If control board checks out as described above, it is not defective, & does not need to be replaced. If any steps above do not operate as described, board may be defective, contact Howe for further tests if necessary.

TroubleShooting Chart

Problem	Possible Cause	Remedy
Operation		
1. Ice flaker will not start.	a. ON/OFF switch is open.	Turn all power switches "ON".
	b. Control transformer is defective.	Check voltage between terminals 1 and 2 on the flaker control module (part E20T48). Normal reading is 24 VAC. If 24VAC is not present, replace the transformer.
	c. Control switches are open.	Check voltage between terminals 1 and 3 on the flaker control module. With all control switches open, normal reading is 0 VAC. With all control switches closed, normal reading is 24 VAC.
	d. Photoeye emitter is defective.	Check LED on emitter. If LED is lit, emitter is functioning properly. If LED is <i>not</i> lit, check to see that power is turned on, and that all connections between the emitter and control panel are secure. If LED still is not lit, replace emitter.
	e. Photoeye receiver is defective.	Check LED on receiver. If LED is lit, receiver is functioning properly. If LED is <i>not</i> lit, check to see that power is turned on, and that all connections between the emitter and control panel are secure. Check alignment of sensors. If possible, remove sensors from their housings, and hold them a few inches apart. If LED still is not lit, replace receiver.
	f. Photoeye control module is defective.	If both sensors are operating properly (see d. and e. above), replace control module.
2. Solenoid valve energizes, drive motor contactor does not energize.	a. Control module is defective	Check voltage between terminals 2 and 6 on control module. If voltage reads 24VAC, replace the control module.
	b. Contactor coil is defective.	Check voltage between terminals 2 and 6 on control module. If voltage reads 0VAC, check wiring and contactor coil for defects.
3. Solenoid valve does not energize, drive motor contactor energizes.	a. Control module is defective.	Close all switches; remove wires from terminals 7 and 8 on the control module. With voltmeter set to "ohms," check for continuity between terminals 7 and 8. If contacts are open, replace the control module.
	b. There is a wiring defect.	Close all switches; remove wires from terminals 7 and 8 on the control module. With voltmeter set to "ohms," check for continuity between terminals 7 and 8. If contacts are closed, check the line "A" jumper, CR ₃ contacts, wiring, and solenoid coil.
4. Drive motor is always on.	a. ON/OFF switch is defective.	Replace ON/OFF switch.
	b. Photoeye controls are defective.	Check per 1.d-1.f above.
5. Solenoid valve is always energized.	a. Control module is defective.	Replace control module.
6. Ice maker does not shut off when bin is full.	a. Photoeyes are not installed.	Install photoeyes per instructions.
	b. Photoeyes are defective.	Check per 1.d-1.f above.
7. Drive motor cuts out	a. A speed reducer gear is worn or broken.	Repair or replace the speed reducer.

Troubleshooting Chart

on overload.	b. Electronic overload is set too low.	Check amp draw on drive motor. If amps do not exceed the nameplate rating, adjust the potentiometer on the control module clockwise until flaker operates properly. Turn potentiometer <i>counter</i> -clockwise just to the point that the overload trips then turn potentiometer clockwise 1/8 turn.
	c. Ice blade is “dragging” on the drum.	Readjust the clearance on the ice blade.
8. Drive motor runs, but main shaft only turns when there is no ice on the drum.	a. The shaft key on the slow speed output shaft of the speed reducer has sheared.	Repair or replace the speed reducer.
Freezing and Refrigeration		
1. Ice freezes along entire length of drum, but harvests only on the lower half.	a. System is short of refrigerant.	Charge system properly.
	b. Suction temperature is too high.	Lower suction temperature to -20°F
	c. Refrigerant flow rate is too low.	Increase flow rate as necessary.
	d. The liquid line filter/drier is dirty.	Replace the filter/drier.
2. Ice freezes and harvests entire height of evaporator, but harvests on only one side of the drum.	a. Main bearings are worn.	Replace worn bearings. Repair or replace main shaft if excessive wear is detected.
	b. Ice blade clearance is too high.	Check and adjust blade clearance as necessary
	c. Top casting was misassembled after bearing replacement.	Re-align and reassemble the top casting. Contact factory for assistance.
3. Ice freezes and harvests entire height of evaporator, but harvests poorly or at random.	a. Feed water is too hard	Install a water softening system.
	b. Freezing surface is coated with hard water deposits.	Clean the evaporator surface with ice machine cleaner.
4. No ice freezes on the evaporator.	a. Loss of refrigerant charge.	Inspect refrigeration system for leaks. Repair as necessary, and recharge system.
5. Flaker makes ice intermittently.	a. Undersized water line.	Install properly sized water line.
	b. Low water pressure (under 20 psi).	Contact factory for guidance.
	c. Water filters are clogged.	Replace water filters.
6. Ice flakes are too thin.	a. Evaporator temperature is too high.	Lower suction temperature to -20°F
7. Ice flakes are too small, with an excessive amount of “snow”.	a. Evaporator temperature is too low.	Maintain suction temperature at -20°F
8. Ice flaker “chatters” and does not run smoothly.	a. Ice blade clearance is too high.	Check clearance and adjust as necessary.
	b. Main bearings are worn.	Replace worn bearings. Repair or replace main shaft if excessive wear is detected.
9. Ice accumulates in the water return trough.	a. Ice deflector is not positioned properly.	Adjust ice deflector position.
11. Ice accumulates in the water return trough, sump, and on the “ribs” in the bottom casting.	a. Ambient temperature is too low.	• If ambient temperature is between 45°F and 50°F, install warm water mixing valve. • If ambient temperature is below 45°F relocate the flaker to a warmer area.
Ice Storage and Removal		
1. Ice flakes are frozen	a. Ice has been left in the storage	• Remove ice from the storage bin daily.

TroubleShooting Chart

together in a hard block.	bin too long.	• Install a clock timer to limit the ice flaker production.
	b. Water level in the sump is too high, causing water to overflow the return trough.	Adjust the water float valve to maintain water level approximately ¼” below the return trough.
	c. Water is overflowing the distribution pan.	• Distribution tubes may be plugged. Clean or replace tubes as necessary. • Level in distribution pan may be too high. Adjust the water-regulating valve to set level in the distribution pan to half-full.
	d. One or more water distribution tubes are missing or broken.	Replace as necessary.
	e. The lead water tube may be splashing water into the bin.	Adjust lead water tube as necessary.
	f. Condensate drip pan is leaking into the storage bin.	Repair or replace drip pan.
	g. Humidity level in storage bin is too high.	• Check and repair bin insulation as necessary. • Check and repair seals on the bin. • Bin door has been left open too long. Close door when not removing ice.
2. Ice in storage bin is too wet.	a. Water level in the sump is too high, causing water to overflow the return trough.	Adjust the water float valve to maintain water level approximately ¼” below the return trough.
	b. Water is overflowing the distribution pan.	• Distribution tubes may be plugged. Clean or replace tubes as necessary. • Level in distribution pan may be too high. Adjust the water-regulating valve to set level in the distribution pan to half-full.
	c. One or more water distribution tubes are missing or broken.	Replace as necessary.
Speed Reducer		
1. Oil is leaking between the front of the motor and the motor mounting flange.	a. High-speed oil seal in the speed reducer is worn.	Replace seal.
2. Oil leaking is evident on the top of the flexible coupling.	a. Slow-speed oil seal in the speed reducer is worn.	Replace seal.

***** IMPORTANT SAFETY NOTICE *****

The information in this manual is intended for use by individuals possessing adequate background in electrical, refrigeration and mechanical experience. Any attempt to repair major equipment may result in personal injury and / or property damage. The manufacturer or seller cannot be responsible for the interpretation of this information, nor can it assume any liability in connection with its use.

***** IMPORTANT SAFETY NOTICE *****

***** DANGER *****

The control panel on this ice flaker may be powered by TWO SEPARATE power sources. Disconnect BOTH SOURCES prior to servicing this piece of equipment. Failure to do this may potentially cause a electrocution hazard.!!

***** DANGER *****

***** WARNING *****

Only technically qualified persons, experienced and knowledgeable in the handling of refrigerants and operation of refrigeration systems, should perform the operations described in this manual.

***** WARNING *****

Service & Adjustment

Replacement and Adjustment of Ice Deflector

To properly install, the upper edge of the deflector should be positioned approximately 1/8" BELOW the aluminum lip under the evaporator.

The ice deflector should be centered beneath the ice cutter blade so that as the ice is removed from the evaporator, it will be deflected into the ice bin opening, away from the water collecting trough. The ice deflector prevents ice from dropping into the water collecting trough.

To replace ice deflector, proceed as follows:

Shut off ice flaker and allow machine to "pump down" (de-ice) once the machine is clear of ice , then you should disconnect the main power to the ice flaker and LOCK THE DISCONNECT SWITCH IN THE OFF POSITION (to prevent accidental start up).

Remove the service access cover on the top casting.

Reaching up from the bin into the freezing chamber, loosen and remove the two 10-24 bolts holding the existing ice deflector in place.

Remove the damaged ice deflector through the bottom opening.

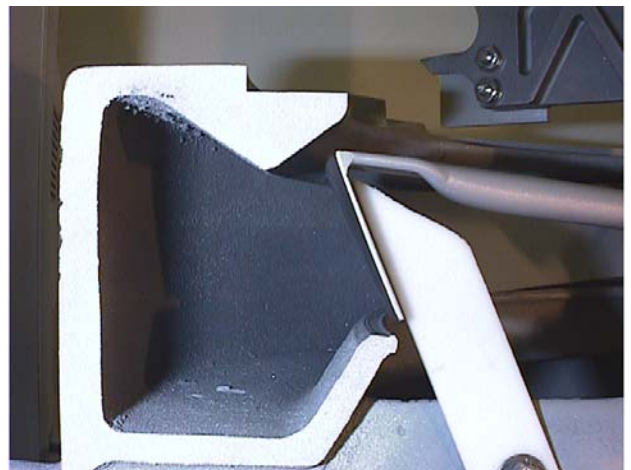
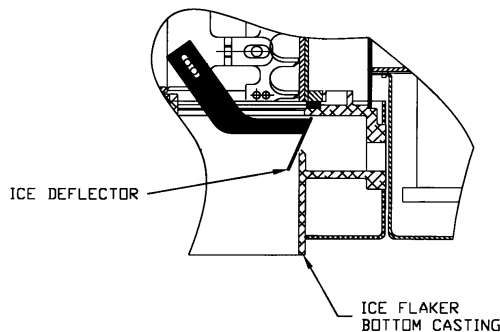
Position and bolt the new ice deflector to the shaft. Tighten the bolts with the deflector adjusted to within 1/8" but NOT touching the evaporator surface or aluminum casting.

Remove all tools from inside the machine and re-attach the service access cover.

Remove lock-out devise from the main power disconnect and turn on the main power.

Turn on the ice flaker switch, and check the deflector to insure that it does not touch the evaporator or aluminum casting.

If the deflector makes contact with the evaporator surface or aluminum casting at any point, then shut down the machine and repeat the above steps to readjust the deflector.



Replacement and Adjustment of Ice Deflector Scraper (2000 & 3000-RLE)

Service & Adjustment

The ice deflector scraper is mounted on one of the three bottom ribs using two stainless bolts and nuts. The scraper's primary purpose is to clear any buildup of ice on the ice deflector as the deflector passes by the scraper. When properly positioned, the scraper will be approximately **C** above the deflector blade. When replacing the scraper, it may be necessary to cut the angled edge down to the proper size. This may be cut with either aviation snips or a razor knife.

Replacement & Adjustment of the Squeegee & Squeegee Wrapper (2000 & 3000-RLE Only)

Shut off ice flaker and allow machine to "pump down" (de-ice). Once the machine is clear of ice , then disconnect the main power to the ice flaker and **LOCK THE DISCONNECT SWITCH IN THE OFF POSITION** (to prevent accidental start up).

Remove the service access cover on the top casting.

Remove 2 or 3 water distribution tubes for easier access.

Reaching down into the freezing chamber, loosen and remove the two 5/16" bolts holding the existing squeegee & squeegee wrapper in place.

Remove the squeegee & wrapper assembly through the service opening. If the squeegee wrapper is not bent out of shape or pitted with rust, then you can remove the rubber squeegee from the wrapper and install a new squeegee in your existing wrapper.

Reinstall the squeegee & wrapper assembly onto the mounting bracket in the freezing chamber, hand tighten the nuts with the squeegee touching the evaporator surface, then move the squeegee assembly approximately 1/16" to 1/8" closer to put a little pressure on the squeegee causing it to bend **slightly** so that it will drag on the evaporator surface.

Do not install the squeegee assembly so close to the evaporator so that the squeegee bends excessively. (this may cause premature squeegee wear and increase load on the gearbox and drive motor).

Tighten down the nuts and bolts only till the lock washers lock, **do not over tighten bolts**, this may cause distortion of the squeegee wrapper and possibly cause premature squeegee wear.

Re-install water distribution tubes.

Remove all tools from inside the machine and re-attach the service access cover.

Remove lock-out devise from the main power disconnect and turn on the main power.

Turn on the ice flaker switch, (you may need to press the overload reset button) and check the squeegee to insure that it touches the evaporator on the entire circumference of the freezing chamber.

If the squeegee loses contact with the evaporator surface at any point, then shut down the machine repeating the above steps to readjust the squeegee a little closer.

Replacement & Adjustment of the Water Distribution Tubes

Service & Adjustment

Adjust lead tube (bottom spout with 90° Elbow), so that the water is dispersed over the evaporator and it doesn't splash water over the ice deflector. If it is adjusted too far forward, the water may cascade down onto the ice deflector and “dribble” onto the ice in the storage bin. If water is running onto the ice deflector, turn the lead tube away from the ice blade, so water does not run onto the ice deflector.

The side spouts are positioned so the ends of the tubes are approximately 3" away from the surface, along the top edge of the evaporator, pointed slightly down towards away from the distribution pan. Ensure that the water level is at least ½ full in the distribution pan, but not overflowing the top. Inadequate water level may cause water to “dribble” out of the distribution tube(s) down onto the ice in the bin, & not on the evaporator.

Replacement of Drive Motor

Disconnect main power to the ice flaker. Remove electric wiring cover on the drive motor. Remove the power leads attached to terminals marked L₁ and L₂.

The drive motor is attached to the gearbox with (4) bolts, through the motor mounting plate. Remove the (4) bolts. The motor may be removed by pulling it away from the gearbox. There are no set screws or couplings, the motor shaft fits directly into the hollow high speed input shaft on the speed reducer with a 3" key. If the old motor cannot be removed easily, then locate two threaded holes on the motor mounting plate. They will be on the horizontal center-line, one on each side of the input shaft. Insert one of the mounting bolts into each threaded hole so they push against the drive motor (you may have to rotate the motor housing so the bolts can press against the mounting lugs on the motor, making sure the bolts do not thread into the mounting lugs.) Turn in both bolts until they are hand tight, then turn in each bolt 2 turn at a time, alternately until the motor is free enough to remove by hand.

When installing the new motor, place the key on the shaft, lightly grease the surface of the motor shaft, and insert in the hole on the high speed input shaft, keeping the keyway aligned with the key. When the motor is in place, rotate it until the mounting lugs are aligned with the (4) mounting holes on the motor mounting plate on the speed reducer. Insert a bolt in each hole and tighten.

Reattach the flexible power cable to the motor, connect the power leads to terminals marked L₁ and L₂, and check to insure the motor is wired for the correct power (115 or 230) and for the correct rotation (CCW). Refer to wiring connections on the motor nameplate for the correct connections.

When the motor is reattached and connected, turn on power and check operation. Place an ammeter on the power line and check to insure the motor is drawing within the nameplate FLA.

Replacement of Speed Reducer & Flexible Coupling

Service & Adjustment

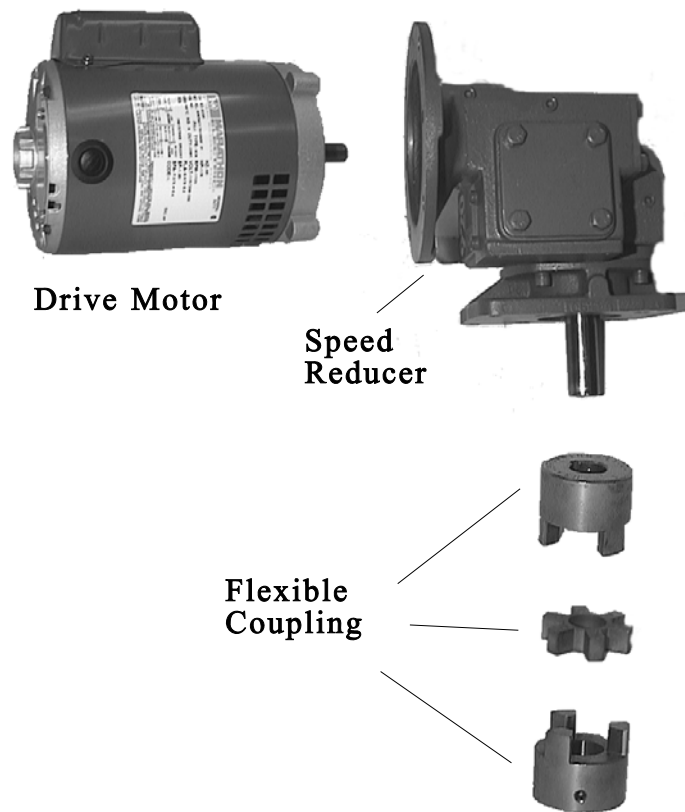
Disconnect main power to the ice flaker. Remove the drive motor as described above, remove (4) mounting bolts attaching the gearbox to the top aluminum casting. The gearbox can then be lifted straight up, the top part of the flexible coupling will lift off with the gearbox, the bronze star and bottom part of the coupling will stay attached to the main shaft.

Loosen the setscrew on the top part of the coupling to remove it from the gearbox. Care should be taken to avoid oil from seeping out the relief vent (located on the top if the gearbox in a set screw) if the gearbox is turned on its side or up side down. The bottom part of the flex coupling is attached to the shaft with a setscrew. Loosen the setscrew, then lift the coupling off the shaft. The use of a gear puller may be required to assist in removing either part of the coupling.

Install the new (or existing if it is not damaged) flex coupling to the shaft and speed reducer, lining up the keyways with the key. Re-tighten the setscrews in both parts. Place the bronze star on the bottom part of the coupling. Install the gearbox (with top coupling attached) onto the top casting, over the bottom part of the flex coupling. If the gearbox does not sit on the top casting properly, you may need to loosen one or both of the setscrews on the flex coupling to allow the gearbox to seat on the machined surface of the casting. There should also be a 1/16" gap between the top coupling half and the bronze star. Rotate the gearbox COUNTERCLOCKWISE ONLY until the mounting holes line up. Once aligned re-install the mounting bolts. Re-position coupling halves with required clearance and re-tighten.

Service & Adjustment

DRIVE MOTOR & SPEED REDUCER 2000 & 3000-RLE (EXHIBIT 13)



Service & Adjustment

Replacement of Electric Eye Sensor(s)

1. Remove front panel of ice flaker by lifting up and away from unit and place aside until finished.
2. Locate cables from ice level sensors (one on the left and right side of ice machine) and disconnect from wiring harness
3. Remove photo eye mounting bracket from bin carefully pulling cable from flaker enclosure.
4. Using two open-end wrenches, placing one on the back nut, one on the forward nut, loosen the nut and remove.
5. Then attach new eye in place of the old one.
6. Tighten the lock nuts, taking care not to over-tighten as this could damage the sensor. Use a maximum torque of 13 lb-in. Carefully route the cable(s) into the ice flaker wiring trough so they are not damaged, re-attach to the wiring harness, packing Molex plug with Di-electric grease to prevent moisture from possibly temporarily “shorting” the trigger signal should the plug get wet. Secure the cable(s) so they cannot be damaged by accident. Ensure there is a “Drip loop” on the cable near the sensor so any moisture accumulating on the cable, will travel to the bottom of the drip loop & drip off, rather than running into the rear of the sensor(s).
7. Turn power on and check alignment of the eyes. When the eyes are properly aligned, the receiver sensor LED will light up. When the signal is blocked, the LED will go out, then after a 15 second delay the solenoid valve will de-energize, and the machine will go into pump down. When the receiver sees the signal after the path is cleared of obstructions, the solenoid will again energize and the machine will start making ice again. *Note: the LED on the Emitter will be on whenever there is power applied to the emitter.*
8. Re-install side panels (if removed), top cover, and front panel.

Replacement of Water Pump

1. Turn off the main power to the flaker, remove screws holding the stationary sump cover, loosen and remove water tube fitting (Nylon compression fitting), unplug the Nyloc electric plug from the wiring harness. Lift the water pump (with cover attached) off the sump.
2. Installing the new pump simply reverse the above procedure. Use caution when routing the new cable to insure they are secured to avoid accidental damage.

Service & Adjustment

Replacement & Adjustment of Water Float Valve

Turn off main power to flaker.

Shut off the water supply to the ice flaker and drain the supply line. Remove water pump & cover as described above. Loosen and remove the compression fitting at the float valve.

While holding the float valve body with a pliers or crescent wrench, remove the water float valve fitting from the valve body. Using a 13/16" socket (a spark plug wrench works great), remove the locking nut from the valve body, (you will need to hold the valve body from turning). Remove the old valve and fibre washer. Install new valve (with fibre washer on the inside of the water sump), tighten the locking nut with the socket. The valve body should be held in place with the discharge port facing straight down. Re-install the float valve fitting, Reattach water supply line. Turn on water shut off valve and check for leaks at the compression fitting and at the float valve fitting. The water level should be maintained to the point just below the water return trough from the evaporator while the flaker is operating. To adjust the operating level, hold the float in one hand, and rotate the plastic float clockwise to lower the water level, counterclockwise to raise the water level (depending on whether the water level is too high or too low.) Care should be used to avoid unscrewing the float body from the shaft. Watch the operation for a while to verify the water level. If the water level is still not where it should be, re-adjust the float.

Replacement of Solenoid Valve

***** SPECIAL NOTE *****

On RL flakers that are connected to a central refrigeration rack system, the two red wires in the main power junction box on the rear of the flaker must be wired together. This jumper will allow the solenoid valve to energize when the operating circuit is energized.

***** SPECIAL NOTE *****

Pump down the ice flaker and evacuate refrigerant from the liquid line. Turn off main power to ice flaker, disconnect wires leads from solenoid valve. Cut out or de-solder the solenoid valve from the liquid line and remove the old valve. Install and solder the new valve into the liquid line, pressure test your connections for leaks.

***** CAUTION *****

ARROW ON SOLENOID VALE MUST POINT IN THE DIRECTION OF FLOW TOWARDS ICE FLAKER.

***** CAUTION *****

Using a high quality vacuum pump, evacuate the liquid line to remove any moisture that may have entered the system while the line was open to atmosphere. Re-connect solenoid coil wires. Turn on main power, turn ice flaker switch on and check operation of solenoid valve.

Service & Adjustment

Electronic Expansion Valve

Cascade CO2 Systems feature a motor operated Electronic Expansion Valve (EEV) which is controlled by a standalone superheat controller, contained in a separate panel on the back or the side of the ice flaker. The controller comes pre-set from the factory to automatically regulate the EEV to the preferred superheat. Therefore, there should be no need to make any adjustments to the controller.

However, if the setpoints have been changed or require resetting, the user can set the controller back to the factory settings listed below. The user may edit the setpoints by pressing the knob and holding it down for 5 seconds. The user is then prompted for a password to verify his credentials. **'111'** should be entered for the password. If the password is correct the user may change the setpoints to the value he desires. Setpoints are saved to the controller when the user leaves the Setpoint menu by pressing the knob when "ESC" is shown. The setpoint menu has a timeout of 60 seconds for inactivity. When the timeout is reached the controller goes back to showing process values and does **not** save any setpoints that might have been changed.

Displayed Menu Item	Description	Factory Setpoints
ESC	Escape and save settings	-
SHSP	Superheat Setpoint	5
rEfr	Refrigerant	R744
d_On	Delay On	0
dOFF	Delay Off	0
d_St	Delay Percent Open of Valve	0
CtSP	Cut-out Suction Pressure	0
H_oP	Maximum Operating Pressure	150
C_in	Cut-in Temperature	-59
Cout	Cut-out Temperature	-60
HiCP	Max Valve Capacity	100
SUPS	Supermarket Setting	OFF
-P-	Proportional Coefficient	40
-I-	Integral Coefficient	25
-d-	Derivative Coefficient	5
StEP	Valve Type	2500
SPoS	Manual Valve Position	-
nEt	Network type	nbUS
Addr	Network Master Address	1
un_P	Pressure Units	PSI
un_T	Temperature Units	FAHR
PtYP	Pressure Sensor	gAUg
CaLP	Pressure Sensor calibration value	0
CLt1	Tout calibration value	0
CLt2	Ctp calibration value	0
CLt3	S-3 calibration value	0
CAdr	Controller Display Address	0

Ice Blade Adjustment

Ice blade adjustment is not normally required, typically the only time this is needed is after bearing replacement. If you suspect the blade needs adjustment because of excessive clearance, it is typically caused by excessive bearing wear, not the blade going out of adjustment. Do not try to adjust the blade clearance without checking for and correcting worn bearings. When checking tolerances, do NOT use automotive “sparkplug” type feeler gauges, you MUST use industrial machine tool type feeler gauges (these are about 1/2“ wide by 12” long). The Automotive type are too short, and not flexible enough to give a true reading. These machine tool type feeler gauges are available from the factory if you cannot locate them locally.

BLADE SETTING CLEARANCE BETWEEN EXTREME OUTBOARD TIP OF ICE BLADE AND EVAPORATOR FREEZING SURFACE MUST BE .004" TO .006" WITH EVAPORATOR AT ROOM TEMPERATURE.

Adjustment Procedure:

With the ice machine turned and locked off, and the evaporator at room temperature, locate exact position on evaporator freezing surface where the clearance between the tip of ice blade and freezing surface is the least. This is accomplished with the use of a feeler gauge. Check clearance top and bottom of blade, rotate blade 60 degrees and recheck clearance. Repeat this operation at a minimum of six points on the circumference of the evaporator in order to determine the point of least clearance accurately.

With the ice blade rotated to the point of least clearance, set gap between ice blade and evaporator freezing surface to between 4 and 6 mil at the top and the bottom of the blade. Tighten the blade mounting bolts and recheck clearance.

Bearing Replacement

- 1) Remove gearmotor by taking out the 4 - cap screws, from the top aluminum casting. & Remove the lower half of the flexible coupling.
- 2) Remove rivets which retain the outer jacket around the ice flaker. Pull the jacket away from the body of the ice flaker.
- 3) Cut away at the upper 3 inches of insulation uncovering 4 - 3/8" cap screws which bolt the upper aluminum casting to the evaporator. Remove these 4 bolts. If spacers are found between evaporator lugs, they should be marked and re-used in the same position. These are required to obtain proper alignment.
- 4) Using a rubber mallet, gently tap the aluminum casting from below (upwards) to free it from the evaporator. Adhesive is used to retain the rubber insulating ring in place.
- 5) Lift up on the aluminum casting and slide it off the shaft.
- 6) Loosen rubber squeegee mounting bolts and push squeegee away from the

Service & Adjustment

evaporator surface.

- 7) Lift the shaft assembly out of the evaporator. Be careful to avoid scratching evaporator freezing surface with the ice blade.
- 8) Examine shaft journals for wear, if worn, repair or replace shaft.
- 9) Remove old oil seals in upper casting.
- 10) Press out bearing in upper casting, using a drift pin or properly sized wood block.
Note: To avoid distortion of casting it should be supported near the bearing area and not on the outer edge.
- 11) Press new bearing into position. Then press the new oil seals into position.
- 12) To remove the bottom bearing, first remove the bottom bearing cover, and the old bearing plate.
- 13) Now follow the same steps as were done for the top bearing. (steps 10-12)
- 14) Install new bottom bearing plate, replace bottom bearing cover.
- 15) Insert the new or repaired shaft. Running clearance between shaft and new bearing must be about .001". Shaft must rotate freely in bearing.
- 16) Re-position rubber insulating ring - use adhesive if possible. Re-install top casting. Make sure that the evaporator lugs are properly seated against shoulders machined in casting. Tighten down the four mounting bolts evenly.
- 17) Shaft must rotate freely by hand. If shaft is tight, it indicates that the top casting is off center.
- 18) Install ice blade and adjust clearance to approximately .003" at closest point. Refer to blade adjustment instructions.
- 19) Re-install bottom half of the flexible coupling.
- 20) Re-install gearmotor.
- 21) Re-install insulation and plastic jacket.

Replacement Parts Listing



Replacement parts for
Rapid Freeze ® Ice Flakers

Effective January 2011

Table	Description	Page
	Cross Section Drawing	47
1	Replacement Parts for 2000 ~ 6000 pound ice machines	48 ~ 49
2	Electrical Panel Parts	49
3	Miscellaneous Parts	50

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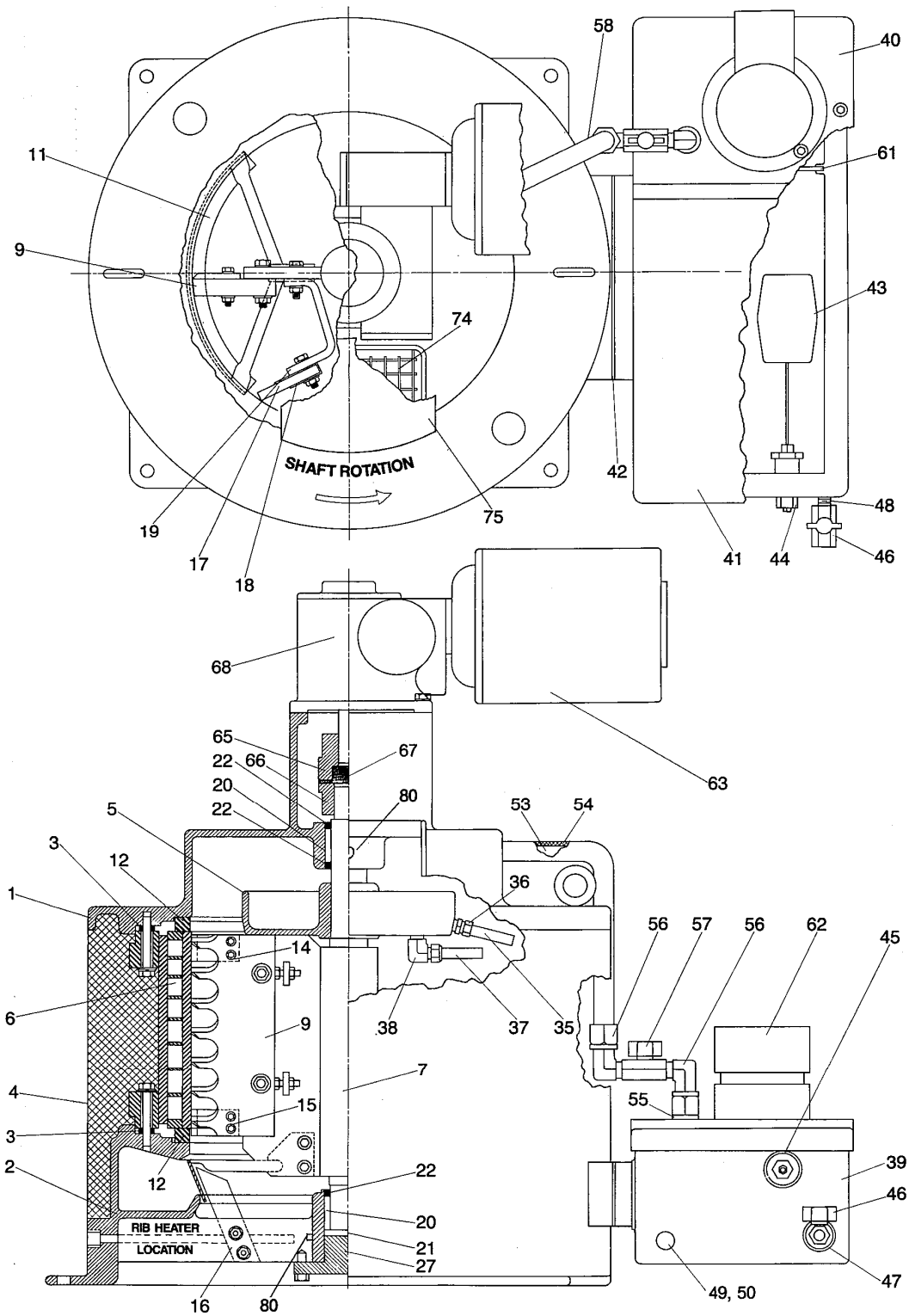
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Models 2000, 3000, 4000, 6000 ICE FLAKERS



CROSS-SECTION

Service & Adjustment

TABLE 1: Replacement Parts for Models Listed to Right		2000	3000	4000	6000
Item No.	Part Description	Part Number			
3	Insulated lug spacers (8)	E20J4			
7	Main shaft	E10D2	E15D2	E20D2	E30D4
9	Ice blade 8½”L, 12½”L, 20½”L	E10E2	E20E2		E30E3
9a	Nuts, bolts & washers (Ice blade)	E10E5	E20E6		E30E5
	Ice blade adjustment gauge kit Set of (5) feeler gauges for ice blade adjustment	E10E15			
11	Ice deflector	E10G1		E20G2	
11a	Ice deflector, scraper & backer plate kit	E10G6-KT		E20G8-KT	
11b	Nuts, bolts & washers (Ice deflector)	E20G5			
12	Insulating ring (2)	E10J1		E20J1	
14 & 15	Top & bottom auxiliary ice scraper	E20E4			
15a	Nuts, bolts & washers (Aux. ice scraper)	E20E7			
16	Ice deflector scraper (Only)	E20G4			
16a	Ice deflector scraper backer plate (Only)	E20G7			
16b	Ice deflector scraper & backer plate kit	E20G9-KT			
17	Squeegee 8½”L, 12½”L, 20½”L	E10F4	E20F4		E30F3
18	Squeegee wrapper	E10F9	E20F9		E30F8
18a	Nuts, bolts & washers (Squeegee wrapper)	E10F8	E20F8		E30F22
19	Squeegee bracket	E10F11	E15F6	E20F11	E30F7
20	Main shaft bearings (2)	E20K1			
21	Bottom bearing thrust plate	E20K2			
22	Main bearing grease seals (3)	E20K3			
22a	Bearing replacement kit (2 bearings, 1 plate & 3 seals)	E20K4			
	Bearing removal / replacement tool kit	E10T1			
	Insulating Ring Tool (used to “pull” out / flush to evaporator)	E10J8			
27	Bottom bearing cover	E10B8		E20B8	
35 & 36	Water distribution side spout & fitting	E10H73 (6)	E20H45 (7)		E30H8 (7)
36a	Water distribution pan assembly (Includes dist. Tubes/fittings) Aluminum pan / copper tubes	-			E30H9
36a	Water distribution pan assembly (Includes dist. tubes/fittings) Plastic pan& tubes	E10H51		E20H44	-
37 & 38	Water distribution bottom spout / fitting	E10H17		E20H38	
	Water sump assembly with water pump	E10H61-P		E10H61	E30H7
	Water sump cover – pump side	F5H25-5			E20H9
	Water sump cover – access side	F5H25-4			E20H10
42	Water sump gasket	E20J2			
43	Water float valve E10H29 (Round float) 6" arm E50H18 (Rectangular float) 11" arm – see p.70	E10H29			E50H18
44	Water float valve fitting	CNB-BR02X06			CNBHF-SG-BR08
53	Water tube kit with regulating valve	E10H67-KT			

Service & Adjustment

TABLE 1: Replacement Parts for Models Listed to Right		2000	3000	4000	6000
Item No.	Part Description	Part Number			
57	Water tube regulating valve	E10H59			
61	Water sump screen	-			E20H13
62	Water pump 115-230/1/60	E10Q7-P	E10Q7	E30Q1	
63	Drive motor 115-230/1/60, 1/3HP, 1/2HP	E20M1-P	E20M1	E30M1	
63a	Drive motor key	E20M8			
65,66,67	Flexible coupling – complete (For speed reducer)	E10N4	E20N9-H		
67a	Flexible coupling key for shaft.	E20N10			
68	Speed reducer for 60cy	E10R6	E20R4		
	Speed reducer for 50cy	E10R5	E20R3		
75a	Handhole cover (Bolt-down)	E10A5	E20A6		
	Replacement rib heater element (3)	HT150-240-037x50			
	Speed reducer oil (Synthetic)	SR-OIL-SYN			
	Solenoid Valve	ME6S140-HP		ME9S240-HP	

TABLE 2: Electrical Panel Parts		2000	3000	4000	6000
Item No.	Part Description	Part Number			
	Control Panel	-		E20T40-RL-HTR	
	Overload reset button – normally open	E20T23			
	ON/OFF rocker switch	E20T24			
	Control transformer – 230VAC primary – 24VAC secondary	E20T31			
	3-pole relay for motor contactor – 24VAC	F5T2		-	
	3-pole relay base	5V013		-	
	4-pole contactor for drive motor – 24VAC	-		E20T44	
	230VAC single pole-double throw relay	-		E20T45	
	Relay base/socket for E20T45 relay	-		E20T46	
	Solid state control module	E20T48			
	Green 24VAC Indicating Light	LGX-24			
	Amber 24VAC Indicating Light	LAN-24			
	Ice level control power module – relay	E20T68			
	Ice level control power module base	5V013			
	Ice level control emitter	E20T104		E20T104-NP	
	Ice level control receiver	E20T105		E20T105-NP	
	Ice level control sensor bracket set	E10U44			

Service & Adjustment

TABLE 3: Miscellaneous Parts		2000	3000	4000	6000
Item No.	Part Description	Part Number			
	Replacement water filter cartridge	E10H57 (1)		E10H57 (2)	
	Replacement o-ring for water filter housing	E10H63			
	Water filter wrench	SW-4			
	USDA approval bearing grease	E20K6			
	Ice machine cleaner	E10V1			
	Ice machine sanitizer	E10V31			
	Electric Expansion Valve	SER-B		SER-C	
	Pressure Transducer	952504			
	Temperature Sensor Assembly	952662			
	Kelvin II	E10T10			